

## CLAIMS

What is claimed is:

1. A method for imaging a lesion using combined near infrared diffusive light and ultrasound, the method comprising:

scanning a subject with ultrasound waves to obtain ultrasound images of a scanned volume, the scanned volume including the lesion;

scanning the subject with near infrared light to obtain optical measurements of the scanned volume;

segmenting the scanned volume into a lesion region including the lesion and a background region absent the lesion using the ultrasound images; and

reconstructing from the optical measurements an optical image of at least a portion of the scanned volume, the reconstructing being performed using different voxel sizes for optical measurements corresponding to the lesion region and optical measurements corresponding to the background region.

2. The method of claim 1, further comprising:

measuring parameters of the lesion using the ultrasound images to provide values indicative of the parameters; and

reconstructing the optical image again using the values.

3. The method of claim 1, wherein the optical measurements include amplitude and phase.

4. The method of claim 1, wherein the reconstructing includes:

determining absorption and scattering coefficients at slice depths in the scanned volume.

5. The method of claim 1, wherein the optical image indicates at least one of wavelength-dependent absorption associated with the lesion and hemoglobin concentration associated with the lesion.

6. The method of claim 2, wherein the values indicate lesion location in the scanned volume and size of the lesion.

7. The method of claim 6, wherein the reconstructing the optical image again includes:

increasing a value indicating lesion size to account for possible inaccuracies of an initial lesion size estimate.

8. The method of claim 7, wherein the value indicating lesion size is a value indicating a diameter of the lesion.

9. The method of claim 7, wherein the reconstructing the optical image again further includes:

controlling the total number of voxel sizes.

10. A method for imaging a lesion using combined near infrared diffusive light and ultrasound, the method comprising:

scanning a subject with ultrasound waves to obtain ultrasound images of a scanned volume, the scanned volume including the lesion;

scanning the subject with near infrared light to obtain optical measurements of the scanned volume;

segmenting the scanned volume into a lesion region including the lesion and a background region absent the lesion using the ultrasound images;

reconstructing from the optical measurements an optical image of at least a portion of the scanned volume;

measuring parameters of the lesion using the ultrasound images to provide values indicative of the parameters; and

reconstructing the optical image again using the values.

11. The method of claim 10 wherein the reconstructing from the optical measurements is performed using different voxel sizes for optical measurements corresponding to the lesion region and optical measurements corresponding to the background region.

12. The method of claim 10, wherein the optical measurements include amplitude and phase.

13. The method of claim 10, wherein the reconstructing includes:  
  
determining absorption and scattering coefficients at slice depths in the scanned volume.

14. The method of claim 10, wherein the optical image indicates at least one of wavelength-dependent absorption associated with the lesion and hemoglobin concentration associated with the lesion.

15. The method of claim 10, wherein the values indicate lesion location in the scanned volume and size of the lesion.

16. The method of claim 15, wherein the reconstructing the optical image again includes:

increasing a value indicating lesion size in the scanned volume to account for possible inaccuracies in an initial estimate.

17. The method of claim 16, wherein the value indicating lesion size is a value indicating lesion diameter.